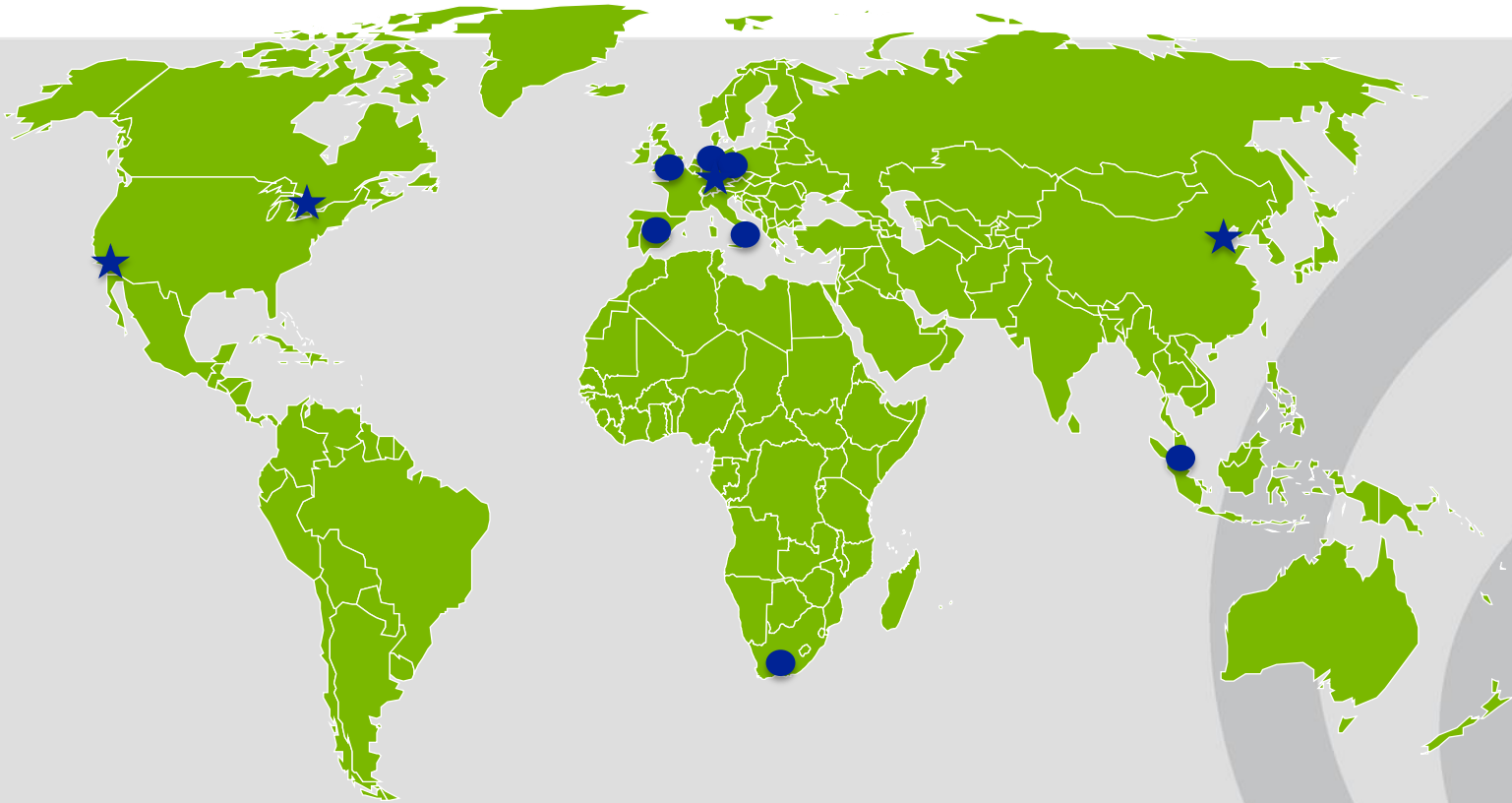




Mixed Waste Organics Extraction and Integrated Organics Management

Los Angeles County
March 17, 2016

Anaergia's Global Footprint



1,600 Projects, 380 MW, 12 Facilities, 29 Patents, 20 Years



The Anaergia Vision



Wastewater
Biosolids



Source
Separated
Organics



Municipal
Solid Waste



Food Processing
Waste



Agricultural
Waste



**Integrated
Organics
Solutions**



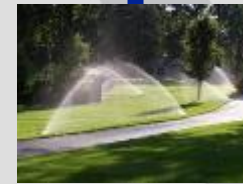
Renewable
Power



Renewable
Gas

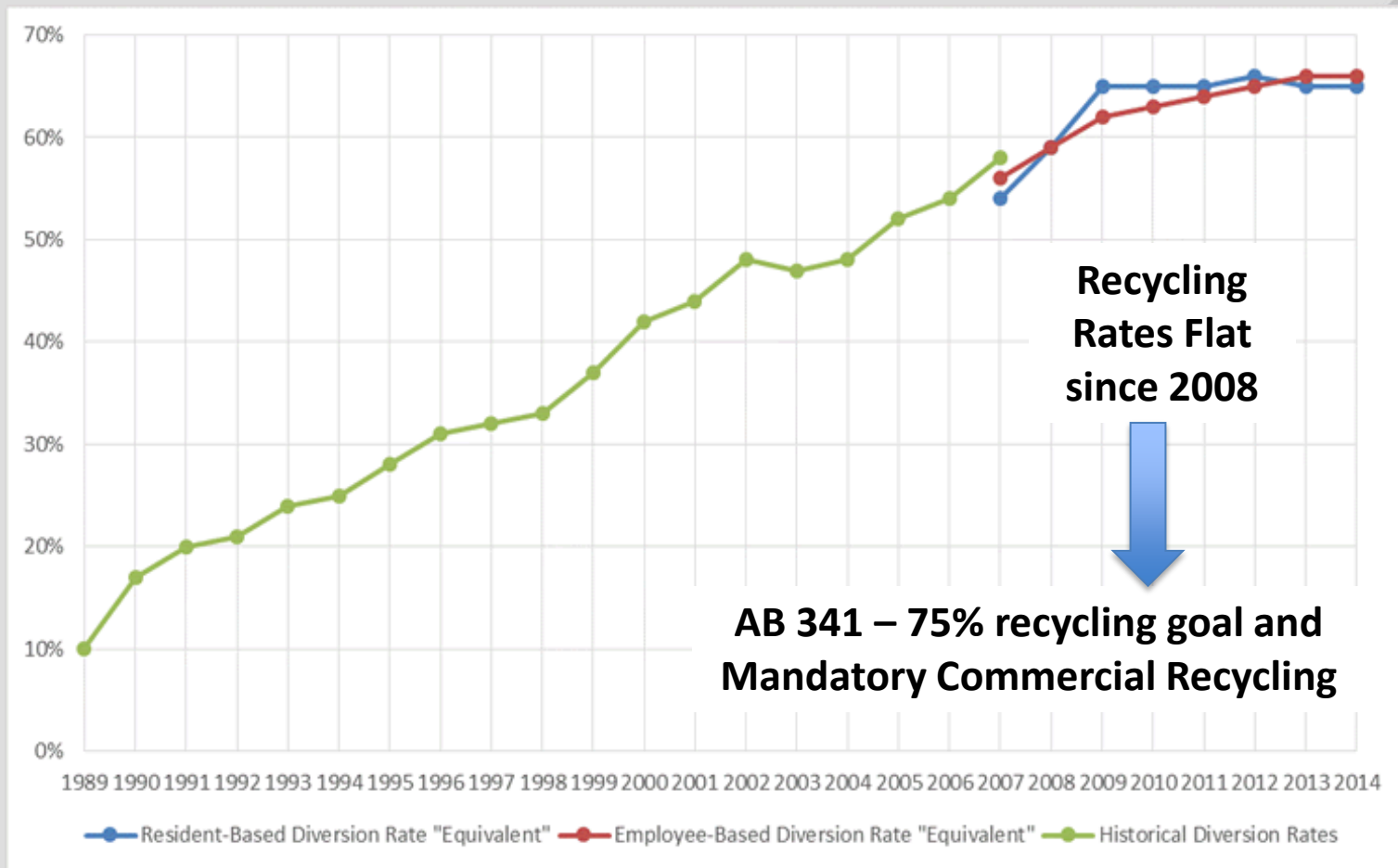


Organic
Fertilizer



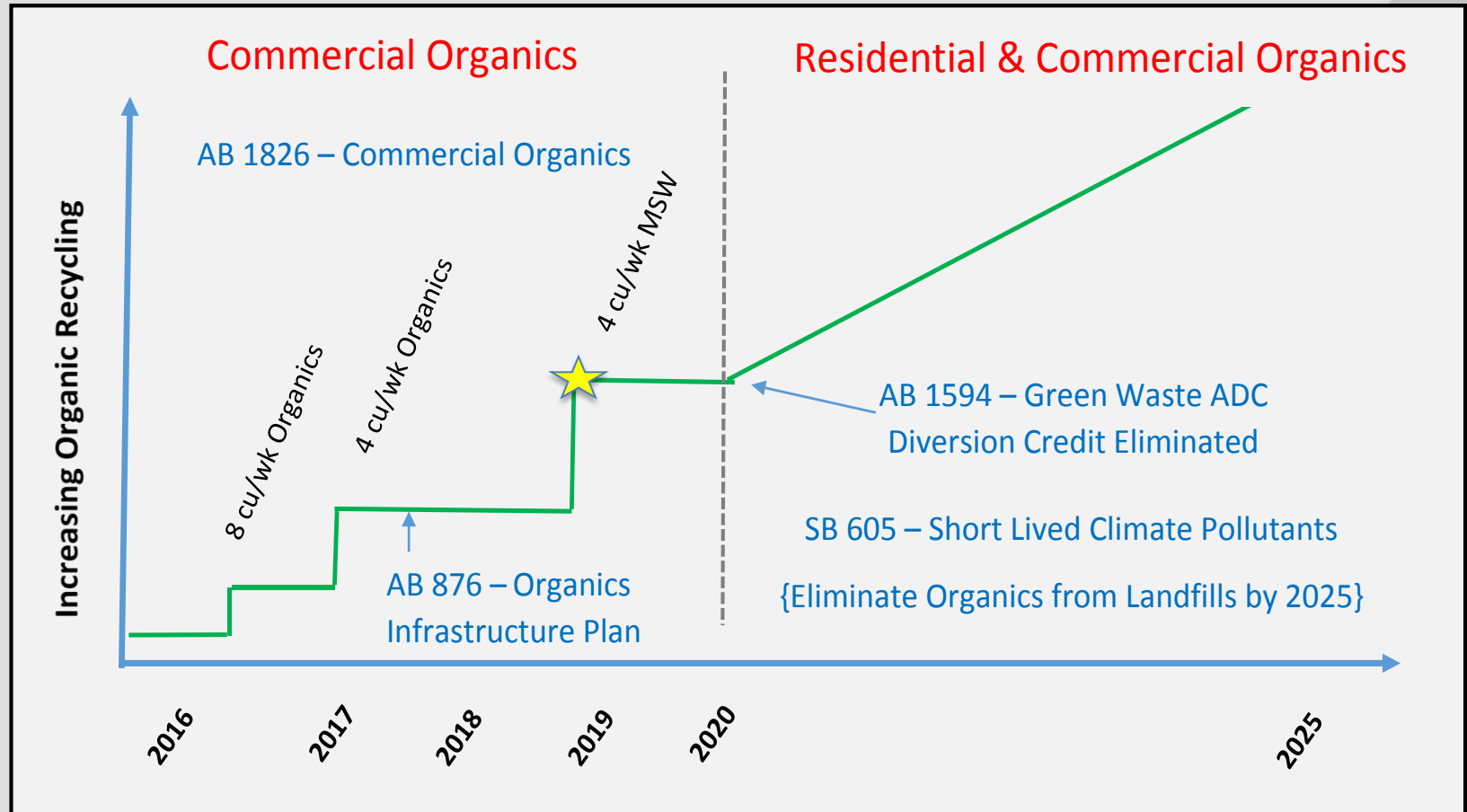
Clean
Water

AB 939 – California Leading the Way in Recycling



California Organics Regulations

Everything is driven by Climate Change



Difficulties in Achieving High Organics Recycling Rates

“Communities Struggle to Enact Residential Food Waste Collection Programs”¹

- Low Participation & Capture Rates
- High Cost – compostable bags, collection
- High Contamination – up to 25%
- Difficult to implement in commercial and multifamily sector



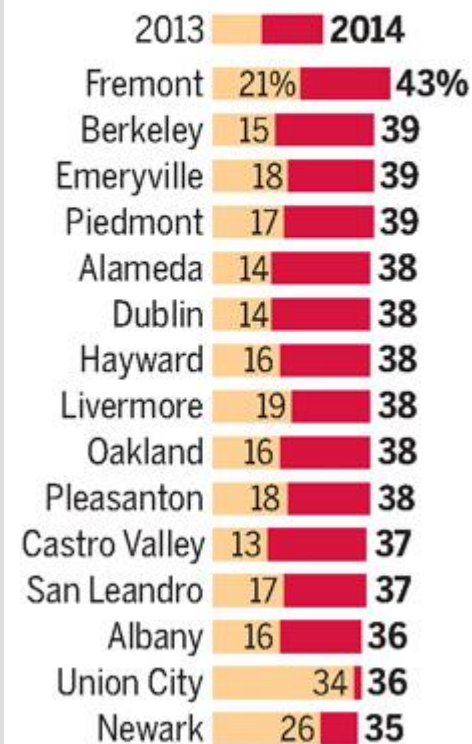
SSO Programs Challenged to meet Climate Change Goals

- Alameda County has instituted residential food waste programs since 2008.
- Alarming dip in participation shows fatigue in participation.
- Regardless, still has a tremendous amount of food waste in disposal



Trash separation dips

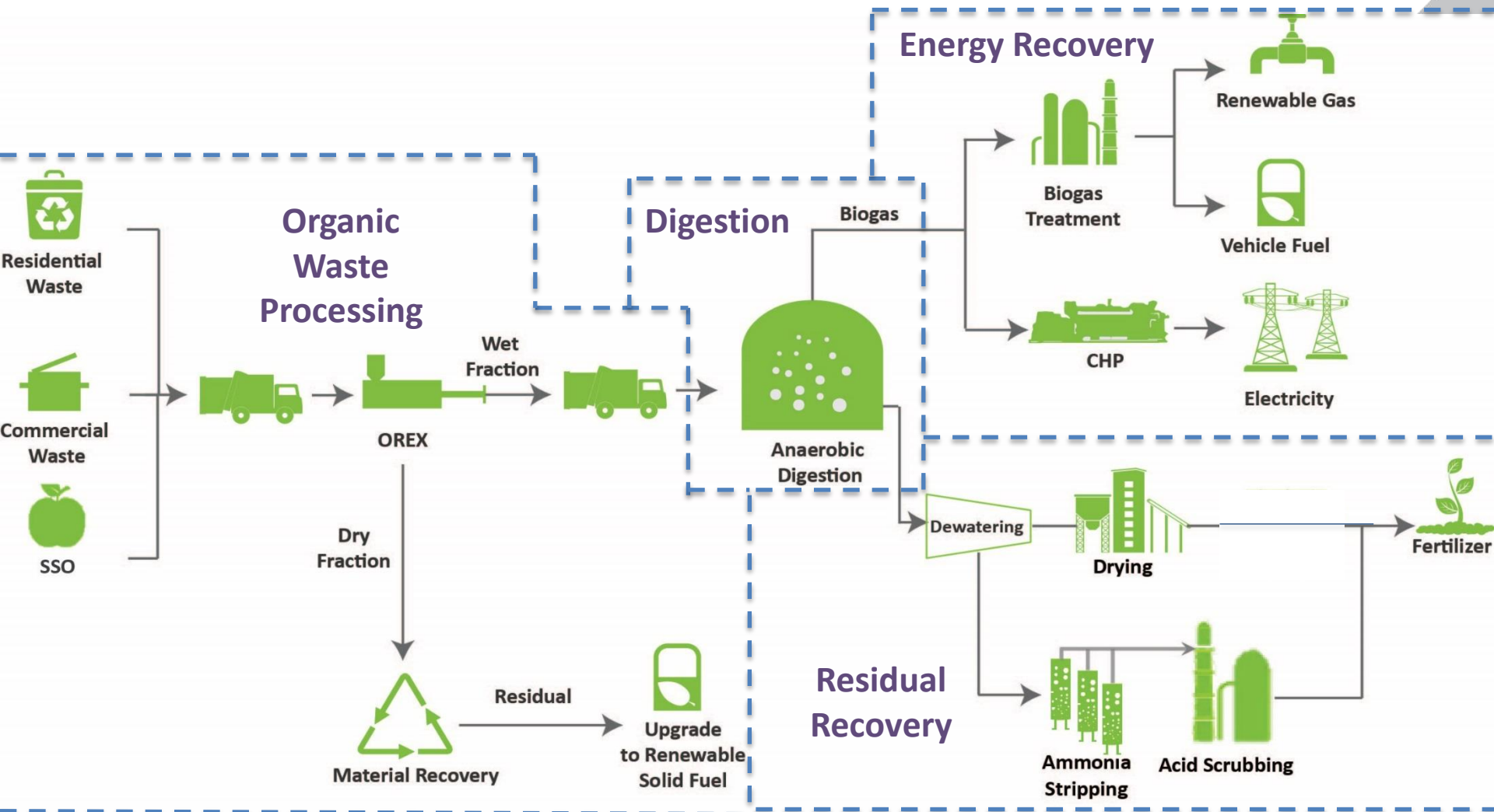
Percentage of trash that is food scraps inside Alameda County residential garbage cans, instead of green waste bins:



Source: StopWaste

BAY AREA NEWS GROUP

Integrated Organics Solutions



Organic Waste Processing (OREX)

Generation 1



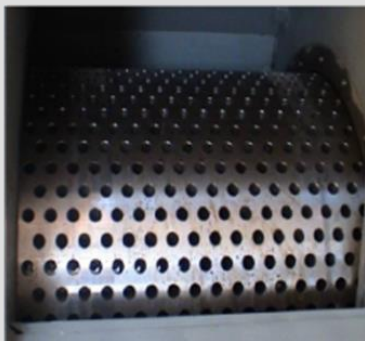
Kaiserslautern, Germany



Generation 2



Ventspils, Latvia



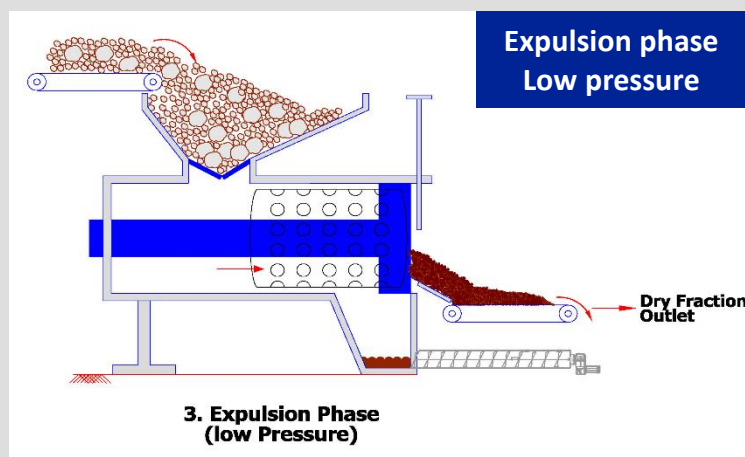
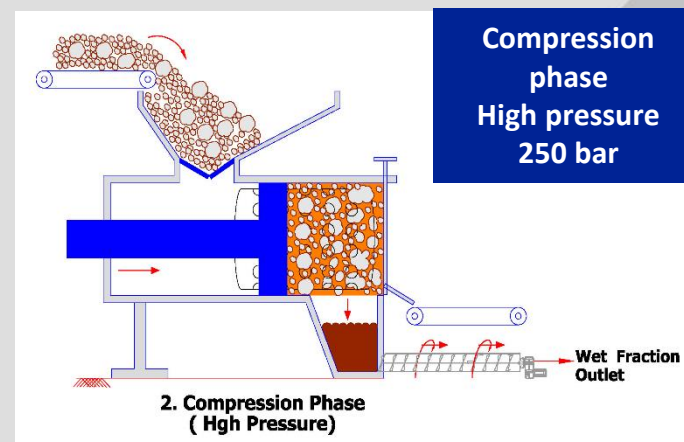
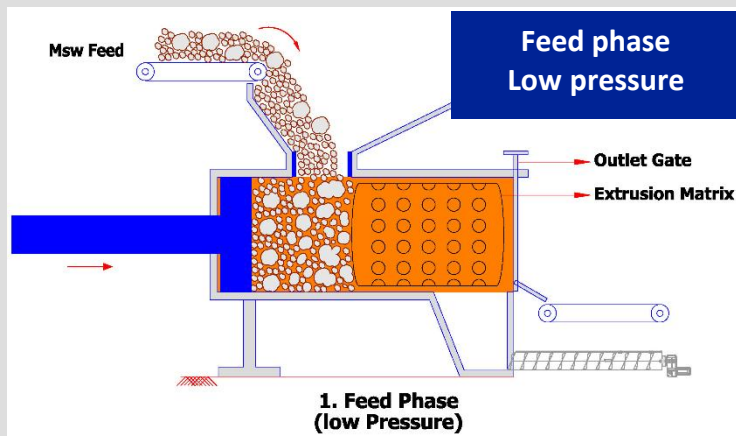
Generation 3



OREX 500 Gescher, Germany



OREX Operating Principal



90%+
putrescible
organics
recovery

- 18 to 22 second cycle time.
- Continuous operation.

OREX Commercial Operating Units

Description of experience/ reference	Country	Capacity	Year
Sorting and treatment of mixed MSW	Kaiserslautern (Germany)	50,000 t/a	2006
Sorting and treatment of mixed MSW	Alessandria (Italy)	100,000 t/a	2007
Treatment of separately collected bio-waste	Castelceriolo (Italy)	25,000 t/a	2008
Treatment of separately collected bio-waste	Viareggio (Italy)	20,000 t/a	2008
Sorting and treatment of mixed MSW / industrial waste	Premier Waste (UK)	100,000 t/a	2008
Treatment of mixed MSW, RDF production	VamWijster (Netherland)	200,000 t/a	last changes 2009
Vagron (MBT) anaerobic digestion of organic fraction from MSW	Groningen (Netherland)	100,000 t/a	last changes 2009



1st OREX Line in North America installed in San Francisco

Anaergia

OREX Processing Line



Bag Opening
(not shredding)



Course Screen



OREX

- Reduces Collection Cost vs SSO Collection w/Wet/Dry Routing
- Achieves Maximum Organics Recovery
- Complements Dry/MF Commercial Recycling Line
- Organics Polishing System cleans Wet Fraction, ensuring beneficial use of digestate (ensures full value of diversion by exceeding CA compost regulations).

Installation of First North America OREX



Clean Digestate is a Marketable Resource

Dirty digestate is waste regardless of nutrient value

Conventional organics separation processes do not meet CalRecycle standards for land application



Hammer Mill
(SSO Digestate Compost)



Trommel Screen
(MSW Digestate Compost)

ANAERGIA ORGANICS RECOVERY PRODUCES CLEAN DIGESTATE



OREX Flexible to Any Level of Contamination



Wet Fraction from MSW or WCW
30-35% TS

30 to 35% recovery from MSW

50 to 70% recovery from WCW (wet commercial waste)

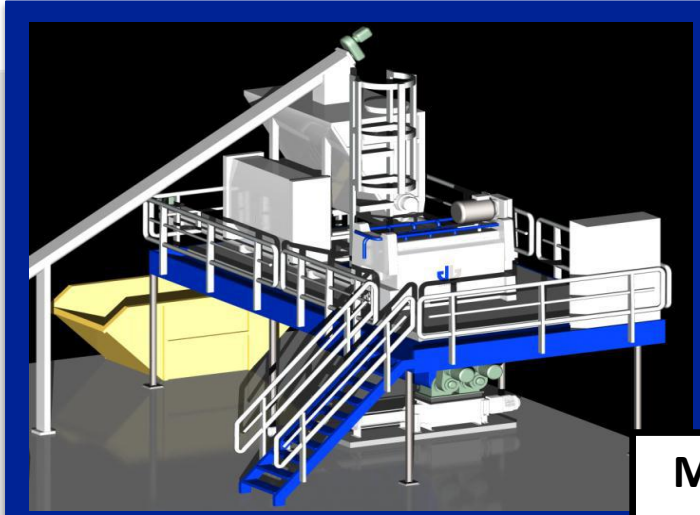


Wet Fraction from SSO
20 – 25% TS

70 to 95% recovery from SSO

Organics Polishing System (OPS)

Two stage plastic film and grit removal system



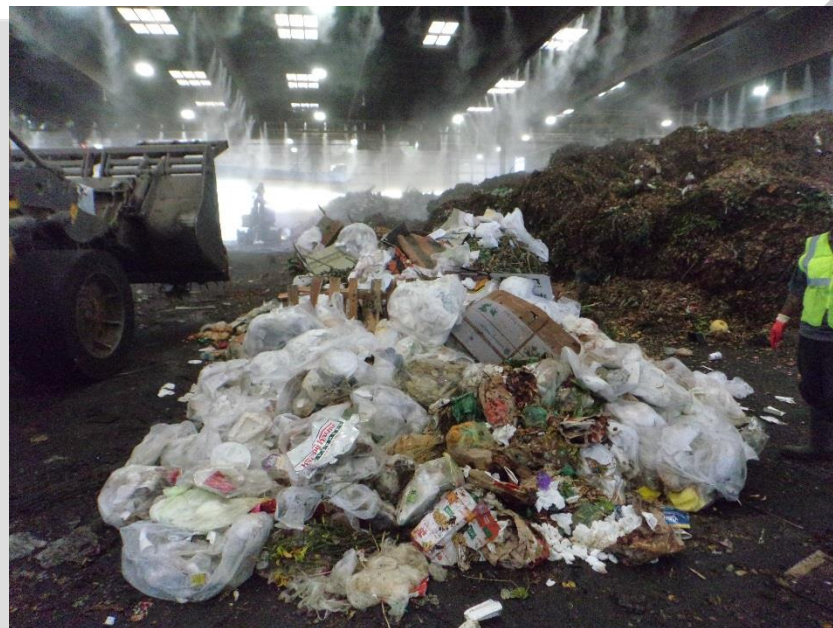
Min. - 85%
removal of
plastic film
and grit



Mini OREX Testing in North America



OREX Test Press – Test Scale



Waste to be Sampled

- Anaergia tested at eight sites in North America
- 5 in CA and now at LACSD
- Complements *standard* waste characterization

North America Testing Results

- New York City (*New Yorkers call it the “Garlic Press”*)
- General results of the tests indicate that with material fed in the < 6 to 8” range:
 - **Single Family Residential – 30 to 35% organics recovery**
 - **Multifamily Residential – 35 to 55% organics recovery**
 - **Wet Commercial Waste – 50 to 70% organics recovery**
 - **Source Separated Organics – 70 to 95% organics recovery**
- <2% physical contaminants > 2mm and low metals content
- Highly digestible with VS/TS in the 85 to 92% range

Dedicated Digestion - London



- **Dagenham, UK (London)**
- **Substrate:** Municipal Source Separated Organic Waste
- **Capacity:** 30,000 TPY
- **Energy Output:** 1.4 MWe, 2.8 MW Total

High Solids Anaerobic Digestion is Capital Efficient

Omnivore™ Retrofit Creates Capacity

High solids retrofit:

1. High Solids Mixers
2. Recuperative- or Pre-thickening



- Increase capacity by 3x
 - HRT = 8-10 d
 - SRT = 24-30 d
- Low power
- Low polymer
- Customize capacity

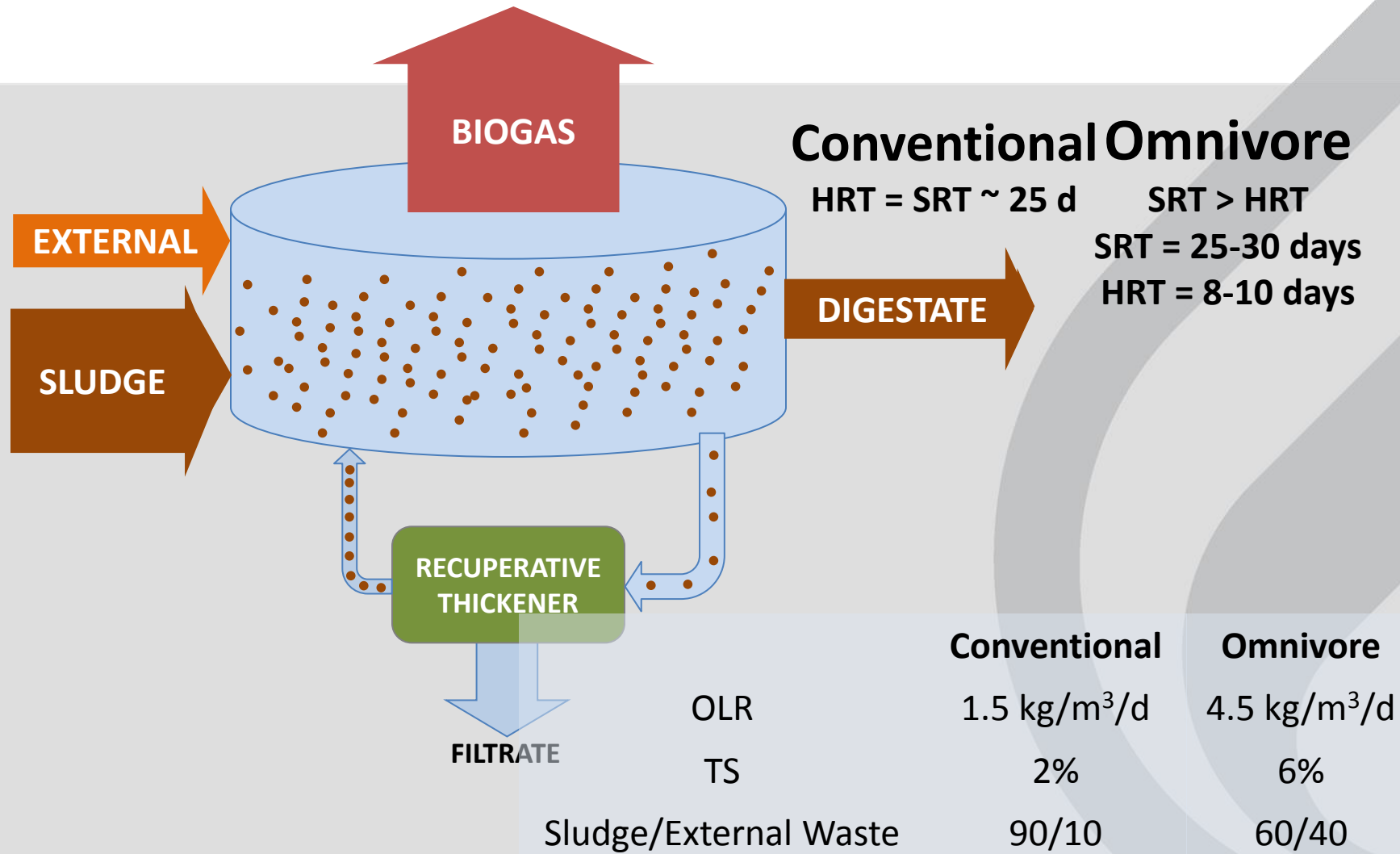


- Isolated service boxes for safe in-situ mixer adjustment
- Adjust position while operating



- High torque, constant torque mixers
- Intermittent operation for less power

Omnivore Concentrates Biomass



Utilizing WWTP Infrastructure – Omnivore 3X Capacity Increase at VVWRA



Omnivore Site Overview



High Strength Waste Receiving Station



Recuperative Thickener SST 225

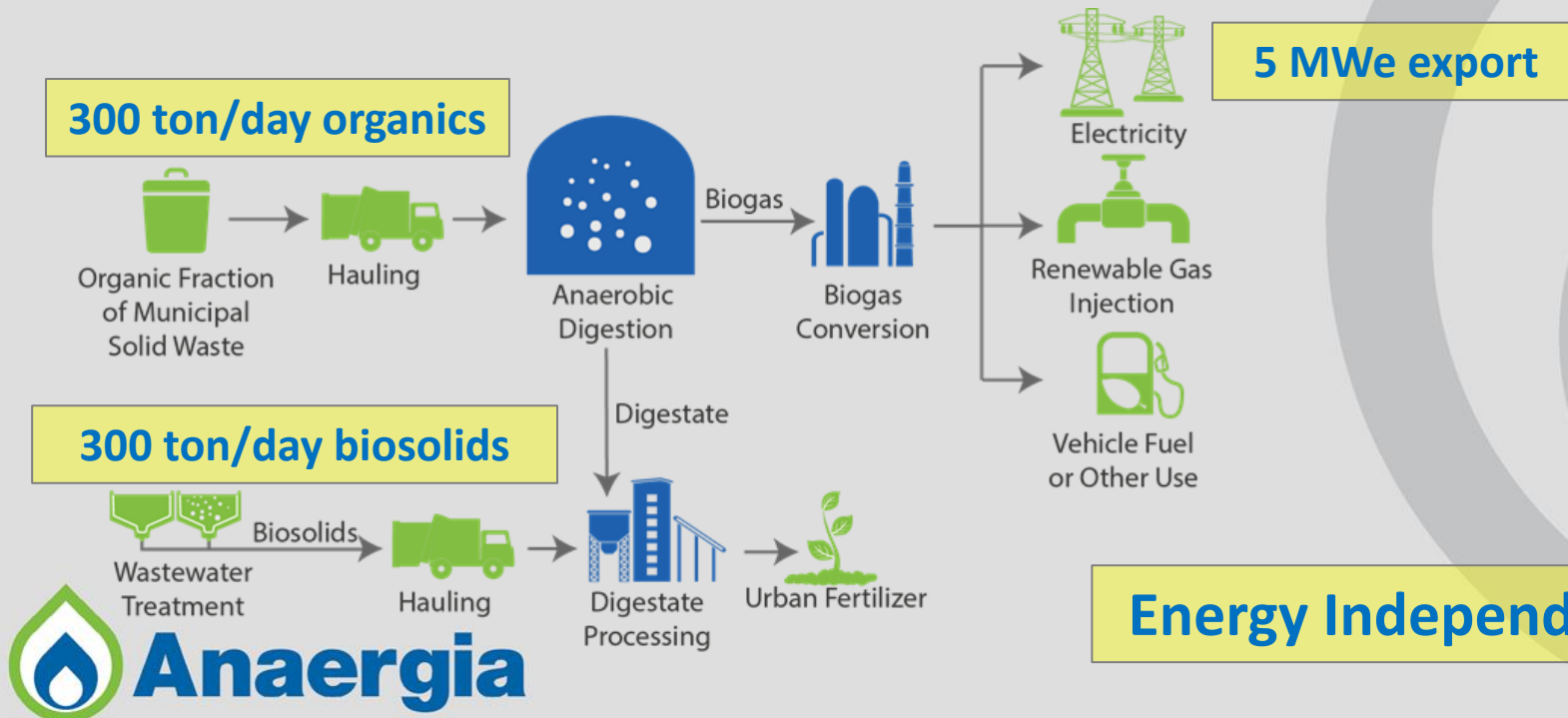
Anaheim Energy – 2017

(Republic Services)



- Phase I: 85,000 TPY wet fraction, Phase II: 170,000 TPY wet fraction
- 4 MW PPA with Anaheim Public Utilities
- Digester Site on < 2 acres

Rialto BioEnergy Facility (Athens Services)



Summary

- OREX Processing Lines offers a key technology for diverting organics from MSW – regardless of contamination. Maximum recovery/lowest collection cost.
- Preprocessing Organics is just one part of the puzzle of an **Integrated Organics Solution** – must consider digestion, and maximizing energy & residual recovery (contamination is biggest threat).
- Organic specific testing should be done to complement standard waste characterization.
- All technologies proposed are commercially proven at multiple facilities globally.

Questions